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ABSTRACT

Major findings are reported of a longitudinal, naturalistic study of grammatical morpheme development in an aphasic child from 5;5 to 6;1. The majority of the morphemes were not acquired in the same order nor at the same mean length of utterance (MLU) levels reported for normal children. As an alternative to the normal acquisition model, based on the theory of cumulative grammatical complexity, it is proposed that the forms developed in order of their semantic and phonological salience, as determined by syntactic, semantic, and phonological context. It is suggested, with respect to current remedial training procedures, that neither the MLU index nor level of grammatical morpheme production serves as a reliable measure of the aphasic child's grammatical knowledge. Given the operation of temporal sequencing constraints, abnormally low levels can result from a strategic tendency to reduce the length and phonological complexity of the sound string or phrase. It is argued that the more redundant and less sonorant items are particularly susceptible to these processing constraints and that their omission does not in itself constitute evidence of a syntactic or cognitive deficit. (Author)

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Grammatical morpheme development in an aphasic child: Some problems with the normative model[1]

(ABSTRACT)

Major findings are reported here of a longitudinal, naturalistic study of grammatical morpheme development in an aphasic child (c.a. 5,5 to 6,1).[1] The majority of the morphemes were not acquired in the same order nor at the same MLU (mean length of utterance) levels reported for normal children. As an alternative to the normal acquisition model, based on the theory of cumulative grammatical complexity, it is proposed that the forms developed in order of their semantic and phonological salience, as determined by syntactic, semantic and phonological context. It is suggested, with respect to current remedial training procedures, that neither the MLU index nor level of grammatical morpheme production serves as a reliable measure of the aphasic child's grammatical knowledge. Given the operation of temporal sequencing constraints, abnormally low levels can result from a strategic tendency to reduce the length and phonological complexity of the sound string or phrase. It is argued that the more redundant and less sonorant items are particularly susceptible to these processing constraints and that their omission does not in itself constitute evidence of a syntactic or cognitive deficit.

Based on the longitudinal and naturalistic study of language development in an aphasic, or language-delayed, child, this paper reports findings which are inconsistent with several claims concerning the acquisition of grammatical morphemes in aphasic subjects: in brief, that these forms are acquired in the same order and/or at the same MLU (mean length of utterance) levels as in younger, normal children (Morehead and Ingram 1973; Kessler 1975; Johnston and Schery 1976). In that the last two studies report significant similarities between the aphasic acquisition sequence and that which Brown (1973) reports for three normal subjects, there is the related suggestion that these forms might evolve, in both cases, in order of their grammatical

[1] Based on an unpublished monograph (Cousins 1979).

complexity (Brown 1973; cf. Tyack and Gottsleben 1974). In practical terms, the claims pertaining to the predictive value of the MLU index and to the universal ordering of grammatical morphemes have been used as the basis of remedial language training procedures (Tyack and Gottsleben 1974; Tyack 1973). In theoretical terms, these comparative and cross-sectional findings have been cited in support of the more general propositions that delayed language development proceeds along the same lines, but later and more slowly, than normal development; and that such a delay is reflective of a more broadly based cognitive deficit (Morehead and Ingram 1973).

However, there are other findings which run counter to various aspects of this formulation.

Emphasizing the dynamic relationship between different dimensions of language development, and proposing that new developments in one area (e.g., semantic relations) can, as a result of increased processing requirements, temporarily offset new developments in another (e.g., lengthening of the utterance through the introduction of new morphological items), Leonard et al. (1976) have questioned the validity of the MLU index "as a global measure of linguistic development" (p. 12), whether it be that of normal or language deficient children.

In conjunction with the widely cited evidence that developmental aphasia is associated with a variety of temporal processing constraints, Tallal (1975, 1977) and Tallal and Piercy (1973a, 1973b, 1974a, 1974b) have argued that the linguistic impairment in aphasic children is neither cognitive nor syntactic, but rather that it is the consequence of an auditory perceptual deficit: namely, "a primary deficit in their ability to [process]...verbal and nonverbal auditory information which occurs

rapidly in time" (Tallal 1975:15). In the same study, the author concludes that aphasic children "have greater difficulty with auditory retention and verbal memory than they do with the grammatical or structural complexity of the language" (p. 18).

Relatedly, Menyuk (1977) suggests that the linguistic performance of aphasic children might be constrained by a "recency memory effect". Their ability in sentence repetition, for example, is exceeded by their ability in spontaneous sentence production. Their performance in sentence comprehension depends, she reports, not on the structure of the sentence, but on the nature (i.e. modality) of the task. Menyuk also notes a strong association between the degree of difficulty in preserving syntactic structure and phonological structure. In general, and as contrasted with "learning disabled" children, the performance of aphasic children was, according to Menyuk, characterized by phonological difficulties, and notably, by the types of sound segment substitutions present in the speech of adult Broca's aphasia (also known as "efferent," "motor" or "expressive" aphasia).

The speech of Broca's aphasics, like that of developmentally aphasic children, is characterized by the frequent omission of function words and inflections. That the omission of these morphological items may be symptomatic of a phonological, as distinct from syntactic, deficit is proposed by Kean (1977) in her recent reinterpretation of so-called "agrammatism" in adult aphasia. This argument is based on what Kean postulates is a differential pattern of grammatical morpheme omission, the vulnerability of the forms being relative to their properties as sound segments and their relation to the base word or stem, as specified by the rules of word formation. In Kean's view, the deletion of these

morphological items arises from a strategic tendency on the part of these speakers to minimize the phonological complexity of the utterance, with no resultant loss of meaning.

It appears that morphological production in normal children is similarly subject to phonological constraints and to resultant sound simplification strategies. In his recent study of the acquisition of morphophonology in normal children, MacWhinney (1978) cites wide evidence in support of the theory that early word formation is "heavily influenced" by "natural predispositions" (p. 17), and that many of these "seem to be based on something like the principle of 'least effort '" (Ibid.). MacWhinney's developmental and cross-cultural data on morphological acquisition "indicate that semantic or grammatical complexity bears no obvious relation to these acquisitions," and with regard to this model, notes that Brown (1973) "has not yet turned his attention to the sequence of acquisition of allomorphs and productions."[1]

The comparative study of grammatical morpheme development in normal and aphasic children had not, as yet, been conducted on the basis of detailed longitudinal and contextual analysis. As noted earlier, the previous reports of normal/aphasic similarities had been based on the cross-sectional method of comparison, the limitations of which have been extensively documented by Rosansky (1976).[2] In addition to this methodological constraint, the aphasic language samples were, for the most part, elicited in clinical or language-remedial settings and from subjects previously or currently exposed to programmatic linguistic instruction.

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[1] Alternatively, MacWhinney reports that "frequency in amalgams is the chief determinant of allomorph acquisition, while frequency of applicability to combinations is the chief determinant of production acquisition " (Ibid.).

[2] Rosansky's analysis concerns the purported similarity between the normal order of grammatical morpheme acquisition and that of second-language learners. The author argues that these similarities are an artifact of the cross-sectional method of comparison.

Given the evidence of temporal processing constraints in aphasic ("dysphasic", "language delayed" or "language deficient") children, and notably, the widely documented observations of sound sequencing difficulties in this population, it was reasonable to postulate that grammatical morpheme production would be differentially affected by these lower-order perceptual factors, and that usage would vary in function of a form's sound and meaning in particular linguistic environments. To test this hypothesis, it was necessary that morphological development be analyzed at the allomorphic level, over a considerable period of time, and within a wide variety of spontaneous utterances.

METHOD

The spontaneous speech of an aphasic child was sampled at weekly intervals over the course of an 8-month period, beginning when the child was 5 years, 5 months of age.[1] Eighty hours of transcription time yielded a total corpus of 3424 utterances. These were analyzed for the development of the 14 grammatical morphemes for which Brown (1973) reports a highly invariant order of (normal) acquisition. Consistent with Brown's procedures, the performance on each morpheme was scored and plotted in terms of the relative accuracy ratio, i.e., number of times supplied/number of obligatory contexts in the child's spontaneous speech. These developments were analyzed in relation to mean length of utterance levels, as plotted over (1) 40 individual sampling points; (2) bi-weekly intervals; and (3) monthly intervals, so as to allow for longitudinal comparison with MLU growth and level of grammatical morpheme development in one of Brown's normal language subjects.

The aphasic order of grammatical morpheme acquisition was based on relative accuracy of morpheme usage[2] as scored on a cumulative basis and as restricted to the final 2-month sampling period. These rank orderings were correlated with Brown's mean order of acquisition and with his "complexity ordering", based on the "cumulative transformational complexity" of the items. In addition, these procedures were separately applied to the developmental ordering of the noun phrase (NP) and verb phrase (VP) constituents.

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[1] The forty 90-minute sessions were conducted under the auspices of the Cambridge-Somerville Mental Health Center. My relationship to David was that of language tutor. The tutorial principally involved various forms of play therapy and did not entail formal or programmatic linguistic instruction.

[2] This is consistent with the procedure used by Brown in ordering the unacquired grammatical items. This number ranged between 5 and 8 morphemes in the three normal subjects.

Based on the results of this comparison, and on the strength of their distributional frequency, a sub-set of 4 morphemes (the copula and auxiliary pairs, contractible and uncontractible) were selected for detailed longitudinal and contextual analysis. The performance scores for present tense be usage were plotted at several, increasingly specific levels of linguistic classification, the most particular being that of the 12 contractible and uncontractible forms in each of four construction types: the simple declarative sentence, the yes/no question, the WH question and the complex construction. The relative accuracy ranking of these items was compared with that reported for Brown's normal subjects, and was internally analyzed for the effects of semantic and phonological (1) identity and (2) salience.

The major results of the normal/aphasic comparison are summarized here and discussed with respect to their implications for the normal and clinical models.

FINDINGS

Between the ages of 5,5 and 6,1, David produced sentences which contained, on the average, from 3.3 to 4.6 words and from 3.7 to 5.2 morphemes (Figure 1). As compared with the monthly MLU curve for Adam, the male subject in Brown's normal language study, David's MLU curve shows a delayed development of about 2 years. Between the time that he was 3½ and 4 years old, Adam's MLU curve rose from the lower to upper limit of Brown's (highest) MLU Stage V. David's MLU shows a comparable development between the ages of 5½ and 6 (Figure 2).

According to a prevailing clinical model of delayed language development[1] (cf. Tyack and Gottsleben 1974), as based on the comparative findings of Morehead and Ingram (1973), it would be predicted that David and Adam, at the upper limit of MLU Stage V, would have reached a comparable level of "linguistic readiness" and, specifically, a comparable level of grammatical morpheme development. However, David had attained Brown's normal acquisition criterion[2] on only two of the nine morphemes acquired by Adam at this time (Figure 2). And these items (the prepositions in and on) are listed in the normal model as the first of the (Stage II) acquisitions. Even with a modified acquisition criterion[3], David's level of grammatical morpheme development showed a lag of two or three MLU Stages as compared to that of Adam.

The acquisition ordering

When ranked in order of the relative accuracy of David's usage, the

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[1] As developed and applied at the Institute for Childhood Aphasia, San Francisco State University.

[2] First of three scores of 90% or better in successive samples.

[3] First of three scores of 80% or better in three successive aggregate samples consisting of a minimum of 200 utterances.

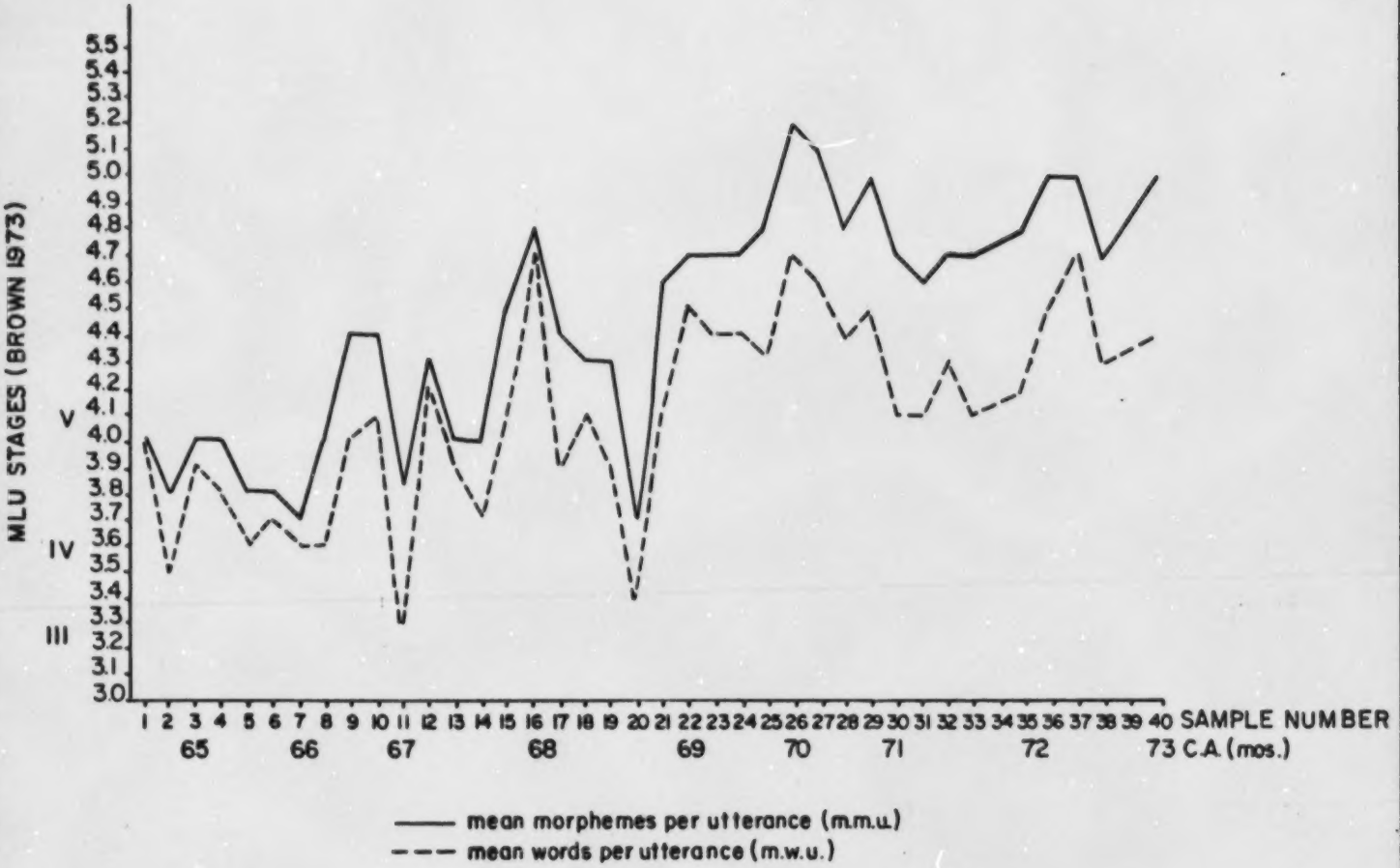

FIG. 2.1 : DAVID'S MEAN LENGTH OF UTTERANCE, PLOTTED IN MORPHEMES(MMU) AND WORDS (MWU), AT 40 SINGLE-POINT SAMPLES (DAILY OR WEEKLY INTERVALS)

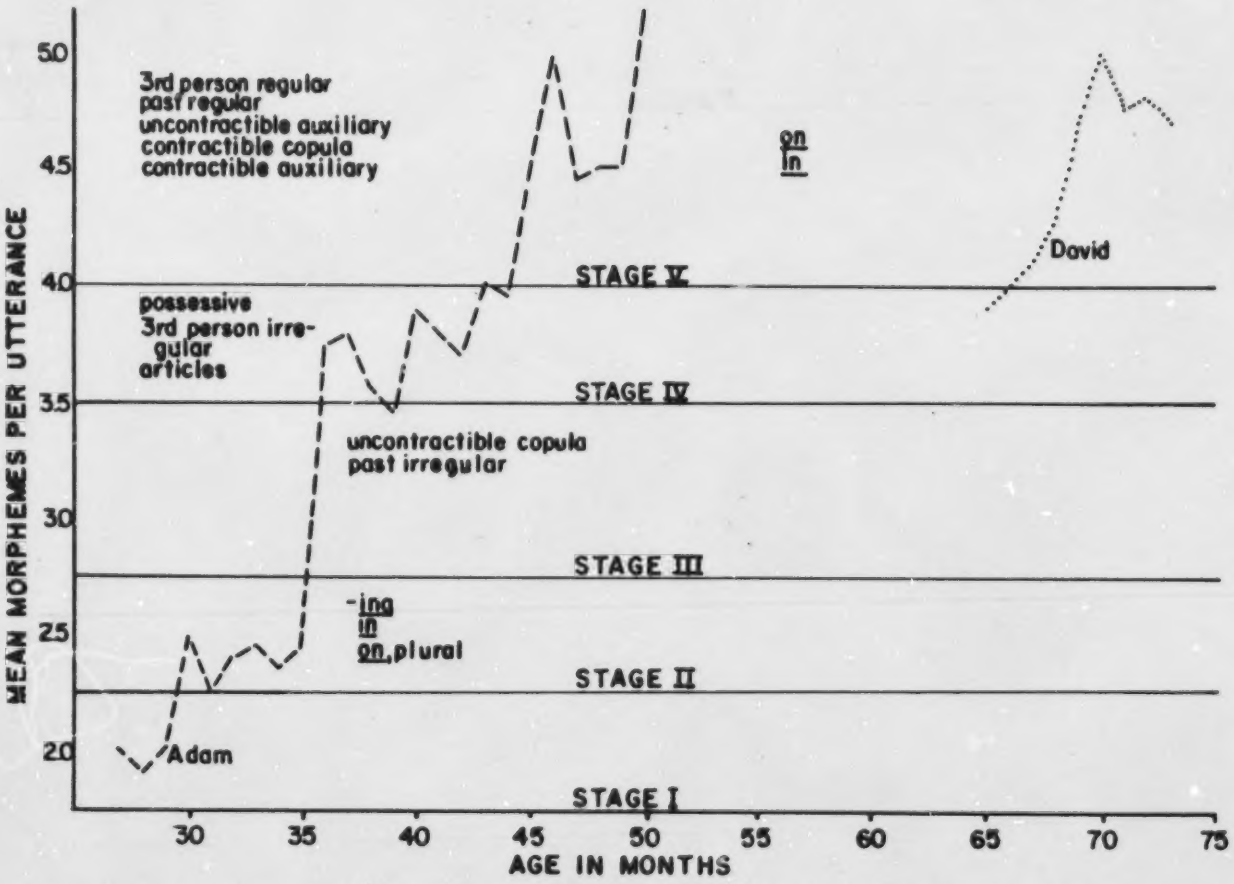

FIG. 2.4 : MLU GROWTH AND GRAMMATICAL MORPHEME ACQUISITION FOR NORMAL CHILD (ADAM) AND APHASIC CHILD (DAVID). ACQUISITION CRITERION AND NORMAL DATA BASED ON BROWN (1973).

14 grammatical morphemes obtained a significant correlation with Brown's mean acquisition ordering (Spearman r = .75; p = .01) [see Figure 3]. They also obtained a significant correlation with Brown's complexity ordering (r = .74). However, these high correlations appeared to be a function of rank-order similarities in the NP constituent class. When ranked separately, the five NP morphemes in the aphasic sequence had a nearly perfect correlation (Spearman r = .98, $p < .05$) with the normal NP morpheme sequence. The nine VP morphemes, on the other hand, did not obtain a significant correlation with the normal VP morpheme sequence (r = .43, $p > .05$)[1] [see Figure 4]. In addition, while the normal ranking of the VP forms continued to show a significant correlation with Brown's complexity ordering (r = .80), neither the NP set nor the VP set in the aphasic ranking obtained a significant correlation with their assigned complexity values (r's = .40 and .55, respectively, with $p > .05$).

Thus, in statistical terms, the order in which David developed usage of the verbal functors and inflections, which constitute the majority of Brown's grammatical morpheme set, could not be accounted for either in terms of their purportedly normal order of acquisition nor in terms of the principle of cumulative grammatical complexity.

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[1] Rank-order comparisons with the sequences reported for each of Brown's three normal subjects yielded non-significant correlations of .54, .46 and .15.

The same results obtain in the comparison of the following sets of data: Brown's normal data and that of Morehead and Ingram (1973); Morehead and Ingram's data and the present aphasic data; and the present data and the normal cross-sectional findings of de Villiers and de Villiers (1973).

In all cases, the rankings based on both NP and VP morphemes obtain significant correlations at the .05 level, whereas the rankings based on the VP morphemes alone obtain non-significant correlations.

Figure 3. Aphasic accuracy ordering of 14 morphemes, based on final performance scores (samples 31-40) and as compared with mean order of normal acquisition[1]

MORPHEME	USES/CONTEXTS	% correct	APHASIC RANK	NORMAL RANK
on	15/15	100.	1	2.5
in	40/41	97.5	2	2.5
plural	60/74	90.5	3	4
past irreg.	42/48	87.5	4.5	5
possessive	7/8	87.5	4.5	6
present prog.	56/65	86.1	6	1
contr. copula[a]	92/111	82.8	7	13
articles[b]	123/181	68.0	8	8
uncontr. copula	32/64	50.0	9	7
3rd person irreg.	5/14	35.7	10	11
contr. aux.	28/94	29.7	11	14
3rd person reg.	3/11	27.2	12	10
uncontr. aux.	0/7	0.0	13.5	12
past regular	0/8	0.0	13.5	9

[1] Based on Brown (1973).

[a] All copula and auxiliary scores pooled across three present tense markers.

[b] Combined scores for indefinite article (90/112) and definite article (33/69).

Figure 4. Comparison between aphasic and normal orderings of noun phrase and verb phrase morphemes*

Constituent Class	MORPHEME	NORMAL RANK	ADJUSTED	APHASIC RANK	ADJUSTED
NP Constituents	in	2.5	1.5	2	2
	on	2.5	1.5	1	1
	plural	4	3	3	3
	possessive	6	4	4.5	4
	articles	8	5	8	5
VP Constituents	pres. prog.	1	1	6	2
	past irreg.	5	2	4.5	1
	uncon. cop.	7	3	9	4
	past reg.	9	4	13.5	8.5
	third reg.	10	5	12	7
	third irreg.	11	6	10	5
	uncon. aux.	12	7	13.5	8.5
	con. cop.	13	8	7	3
	con. aux.	14	9	11	6

*Normal ordering based on Brown's (1973) mean order of acquisition.

The shape of the skew

A simple descriptive statistic $(D_{k\phi})$[1], hereafter referred to as D, was devised in order to measure the relative magnitude of the individual differences between the normal and aphasic ranks of the 14 morphemes. D was defined as

$$D = \sum_{i=1}^{N} /d_i/$$

where N equals 14 and where $/d_i/$ equals the absolute difference between the normal and aphasic ranks. The amount of displacement for a given morpheme or group of morphemes could then be expressed as a proportion, i.e., d_i/D.

The sum of the differences between all items is 31. This is the total magnitude of the skew. It was found that a disproportionate share of D was carried by the 9 VP morphemes. While comprising 64.2% of the total set, they accounted for 82.2% of the rank-order displacement. While comprising 35.7% of the set, the NP morphemes accounted for 17.7% of the total displacement.

With the exception of the present progressive suffix, the VP set consists of four semantically identical pairs: (1) the copula pair, contractible and uncontractible; (2) the auxiliary pair, contractible and uncontractible; (3) the present tense pair, regular and irregular; and (4) the past tense pair, regular and irregular. The common contrastive features here are $\pm$ contractibility (of <u>be</u> forms) and $\pm$ regularity (of verbal inflection). Together, the 4 pairs comprise 57% of the morpheme membership. They account for a total displacement of 20.5, or 80.3% of D.

[1] Cousins-Fjellman 1977

The direction and magnitude of the rank-order displacements were then analyzed in terms of these sets and their common contrastive features. Given that we were concerned with (rank-order) movement within a closed system, some of the items had to be displaced upwards and some downwards. However, from a formal point of view, there was no constraint upon the linguistic structure of this displacement pattern.

As shown in Figure 5, however, the deviation from the normal acquisition sequence was found to have a strong and consistent linguistic structure. The two contractible morphemes accounted for the major positive displacement, and their uncontractible counterparts, a minor negative displacement. Conversely, the two regular morphemes accounted for the major negative displacement, and their irregular counterparts, a minor positive displacement. Contractibility was found to be the single most powerful constrastive feature underlying the differences between the normal and aphasic orders of grammatical morpheme development. The contractible copula and auxiliary morphemes, while comprising 14.2% of the morpheme membership, together accounted for 29% of the total skew -- and in this case, a positive deviation. This is to say that the two contractible morphemes, consisting of the copula and auxiliary markers /ɨz~-s~-z/, /æm~-m/ and /ar~-r/, emerged earlier than would have been predicted on the basis of (1) the normal acquisition sequence, in which they occupy the last two ranks and (2) the theory of cumulative grammatical complexity, by which they would be expected to develop later than their purportedly less complex uncontractible counterparts.[1]

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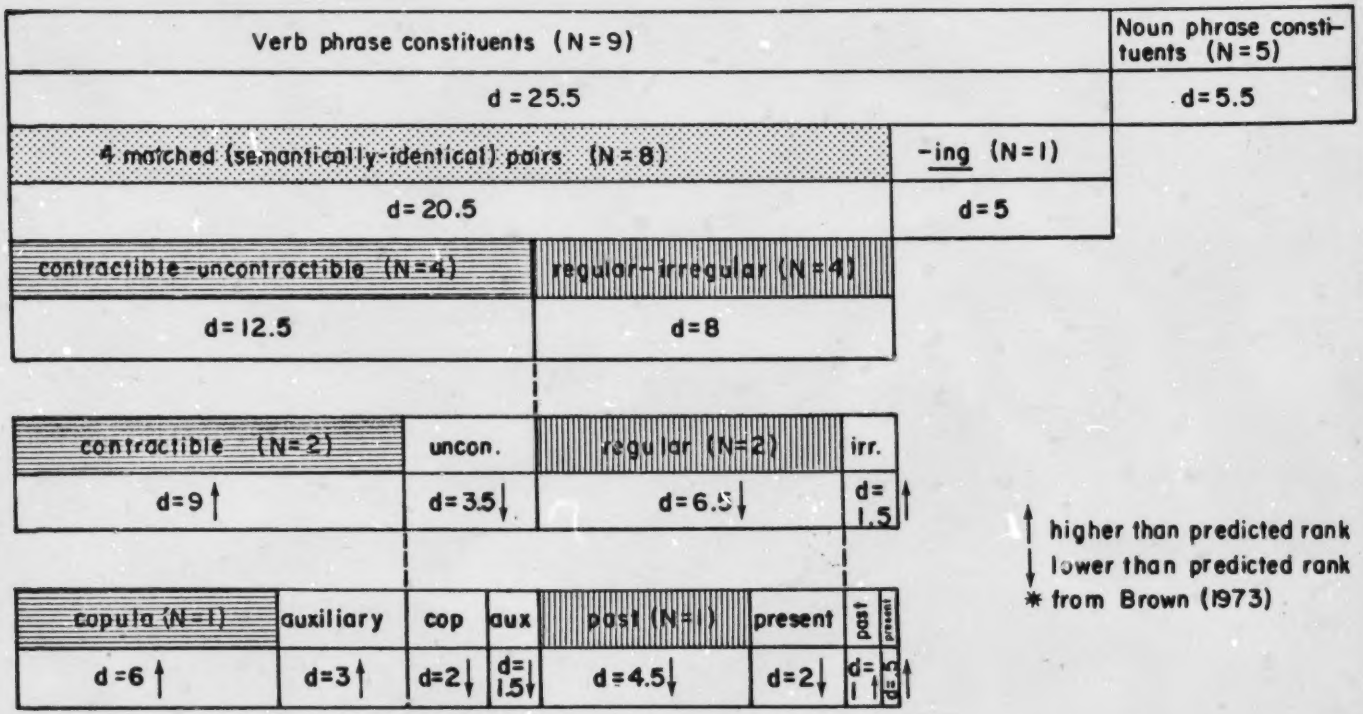
[1] As shown in Figure 3, the contractible copula occupies the middle rank and in final performance score is about 37 percentage points higher than the uncontractible copula. The latter is reported to have developed well in advance of its contractible counterpart in all three children (Brown 1973; 271 et passim), and for two subjects is listed as a Stage III acquisition (Ibid.).

TABLE 7: PROPORTIONAL DISPLACEMENT OF VERB PHRASE CONSTITUENT MORPHEMES, AS BASED ON DIFFERENCES BETWEEN APHASIC AND NORMAL* RANKINGS



The four be morphemes

In the further comparison of normal and aphasic development patterns, the set of 4 "be morphemes" was selected, for a number of reasons, as the subject of detailed developmental investigation. As noted above, the set of items accounted for the major share of the deviation from the predicted acquisition sequence and, in terms of their internal positioning in the aphasic ranking, developed in an opposite-to-predicted order. In terms of the available data base, these forms had relatively high frequencies both of obligatory contexts (being required a total of 869 times, or, on the average, in about 1 out of 3 utterances) and of actual uses (being produced a total of 399 times, or in about 1 out of 4 instances of grammatical morpheme usage). Finally, the linguistic structure of the be morpheme set allowed for the controlled comparison of syntactic and phonological variables. To investigate the effects of these variables, and also that of "relative complexity," the developmental analysis was taken down to the level of what Brown refers to as the "allomorphs"; that is, the level of the three individual present tense forms (is, am and are) which, in the normal acquisition model, makes up each of the morphemes.[1] This gives us a set of 12 forms, as shown below (Figure 6).

Figure 6. The be morpheme set

I Form Class		COPULA		AUXILIARY	
II "Morpheme"		contractible	uncontractible	contractible	uncontractible
III Marker*	1	/æm~~m/	/æm/	/æm~-m/	/æm/
	2	/ar~-r/	/ar/	/ar~-r/	/ar/
	3	/ɨz~-s~-z/	/ɨz/	/ɨz~-s~-z/	/ɨz/

*Also, "form", "allomorph" (Brown 1973).

[1] In calculating the normal order of be morpheme acquisition, Brown collapsed the scores on the three present tense "allomorphs" in each of the four morpheme sets. He "disregarded the allomorphs because the significance of this dimension of variation [was] marginal" (1973:269).

As shown in Figure 6, the four morphemes consist of six phonologically identical and six semantically identical pairs. The longitudinal and contextual analysis of David's usage was ultimately concerned with the fact that these identities in sound[1] and meaning[2] cut across the "two major contingencies" by which the 4 morphemes are defined, and to which Brown attributes the order of their normal development.[3] It was postulated that the developmental relationship between forms having either the same meaning or the same sound would, by virtue of their common semantic or phonological salience, prove to be closer than the developmental relationship between forms of the same grammatical or phonological class. The hypothesis said, in other words, that the horizontal relationship between the forms (as shown in Figure 6) would prove to be of greater developmental significance than their vertical relationship, as predicted by Brown's normal acquisition model. At a more general level, this was to question the integrity of each morpheme set as a unit of grammatical knowledge or behavior. This entailed the prediction that production patterns for the entire set would not be accountable in terms of the complexity values assigned to the morphemes.

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[1] For example: of the 3ps copula in the sentence The horse is big and of the 3ps auxiliary in The horse is running. Also, e.g., the 1ps copula in I'm here and the 1ps auxiliary in I'm going; the plural copula in They're nice and the plural auxiliary in You're reading.

[2] For example: of the 3ps uncontractible copula in the sentence This is a book and the 3ps contractible copula in That's a book. Also, e.g., the 1ps uncontractible copula in Yes I am and the 1ps contractible copula in Yes, I'm here; the plural uncontractible auxiliary in The horses are eating and the plural contractible auxiliary in They're eating.

[3] Contractibility and grammatical class are reported by Brown (1973:381) to be the "two major contingencies affecting the probability that be forms will be...absent in child speech."

Contextual analysis

The total frequencies of be contexts and uses are shown in Figure 7. The copula forms, required in a total of 592 contexts and supplied a total of 336 times, were found to represent the most substantial portion of the be morpheme data base, and for this reason were selected for extensive contextual and comparative analysis. To test for the effects of syntactic, semantic and phonological variables, it was necessary that the comparison of contractible and uncontractible usage be controlled for marker (is, am, are) and construction type (simple declarative, yes/no question, WH question and complex construction). Contractible usage was additionally analyzed for production of the allomorphs /ɨz/, /-s/ and /-z/.

Given Brown's observation that contractible forms are normally deleted in a higher proportion of "all possible cases" than are uncontractible forms (1973:382) and given the theory that this is in function of their greater phonological complexity, short form usage being said to entail a number of additional rules governing contraction (Ibid.:384), David's use of the contractible copula was also analyzed for the exercise of the long form vs. short form option.[1]

Each of the two copula morphemes was characterized by a differential pattern of omission. At the most general level, production patterns varied in function of the marker, the third person singular form showing far greater development in both cases than either am or are. This was found to be consistent with the much higher frequencies with which the

[1] It will be noted that the phonological complexity in question is that of contracted, as distinct from contractible, forms. This raises a number of problems with Brown's interpretation of his normal data. These resist summary here (see Cousins 1979).

Figure 7. Total frequences of BE morpheme uses and obligatory contexts

MORPHEME	USES	CONTEXTS	% correct	% total uses	% total contexts
contractible copula	249	376	66.2	62.4	43.2
uncontractible copula	87	216	40.3	21.8	24.9
copula pair	[336]	[592]	[61.8]	[84.2]	[68.1]
contractible auxiliary	61	245	24.8	15.2	28.2
uncontractible auxiliary	2	32	6.3	.5	3.7
auxiliary pair	[63]	[277]	[22.7]	[15.8]	[31.7]
TOTALS	399	869	45.9	100.	100.

3ps forms were required. In both the contractible and uncontractible sets, 3ps development was followed by that of the plural[1] and first person singular markers, respectively. This, too, was consistent with the strength of the relative frequency of obligatory contexts. The disaggregated performance data are shown in Figure 8.

Within the category of the individual markers, performance patterns showed differential development across the four construction types. The most frequently occurring context for all forms was the simple declarative (Type I) construction. With the exception of the uncontractible 3ps copula, the higher frequency of the Type I construction was consistent with the higher accuracy scores and smoother performance curves for the forms required. Complexity of sentence structure did not prove to be an overriding factor. Be forms were supplied in the complex (Type IV) constructions with as great or greater consistency than those required in the (typically uninverted) yes/no question.

Within the context of the particular construction types, individual forms were subject to a differential pattern of omission as specified by lexical and phonological context.[2]

Object naming and description was one of the most predominant of David's speech activities. This fact, in conjunction with David's naming difficulties, and a subsequent (early) tendency toward circumlocution, ostensibly gave rise to the frequent use of demonstrative pronouns (dis, dat, dese, and dose). It was in the context of this highly frequent

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[1] The term "plural marker" is inclusive here of its function as a 2nd person singular marker.

[2] The following description pertains only to central tendencies in the data. The actual performance ratios and the analysis of related patterns are presented in the original study.

Grammatical class (I)	COPULA		AUXILIARY	
"Morpheme" (II)	Contractible	Uncontractible	Contractible	Uncontractible
am (III-1)				
use/context ratio	3/19	0/2	12/73	0/0
cumulative score	15.7%	0.0%	16.4%	0.0%
% morpheme contexts	5.1	.9	29.8	0.0
are (III-2)				
use/context ratio	5/19	14/54	7/78	1/26
cumulative score	26.3%	25.9%	8.9%	3.8%
% morpheme contexts	5.1	25.0	31.8	81.3
is (III-3)				
use/context ratio	241/338	73/160	42/94	1/6
cumulative score	71.3%	45.6%	44.6%	16.6%
% morpheme contexts	89.8	74.1	38.4	18.7

Figure 8. Cumulative performance scores for 12 present tense forms of be

Type I construction, viz.,

(1) Dem PN + copula [+ mod] + N/Adj[1]

or the less frequent Type II construction

(2) QDem PN + copula [+mod] + N/Adj [+tag]

that be usage could most clearly be examined for the effects of syntactic and phonological variables. The findings here need to be prefaced by several related observations.

With several important exceptions, contractible form usage developed in advance of uncontractible usage, and, in the case of the contractible 3ps marker showed the most consistent and progressive development over the 8-month period (Figure 9).[2] In the vast majority of cases (more than 90% of all 3ps contractible copula uses) the short form or clitic was produced rather than the optional long form variant. Of the two short form allomorphs, however, the voiced /-z/ clitic was the earlier development, being supplied with only minor exception in the Type I frame (the form being affixed to phrase-initial words of one syllable). The /-s/ allomorph showed a less regular pattern, particularly where required between stop consonants or where it followed the pronoun Dat. Usage in the yes/no question (2) was somewhat less consistent than in the affirmative construction (1). However, /-s/ was rarely deleted before vocalic segments and never before the articles a or /ə/. The form was vulnerable to deletion where it was required before other grammatical modifiers, particularly those beginning with consonants.

What accounted for the relatively low accuracy score (28/70, or 40%) for the uncontractible copula in the Type I construction, and for the

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[1] Brackets enclose optional constituents.

[2] See also Figure 10, for contrasting case.

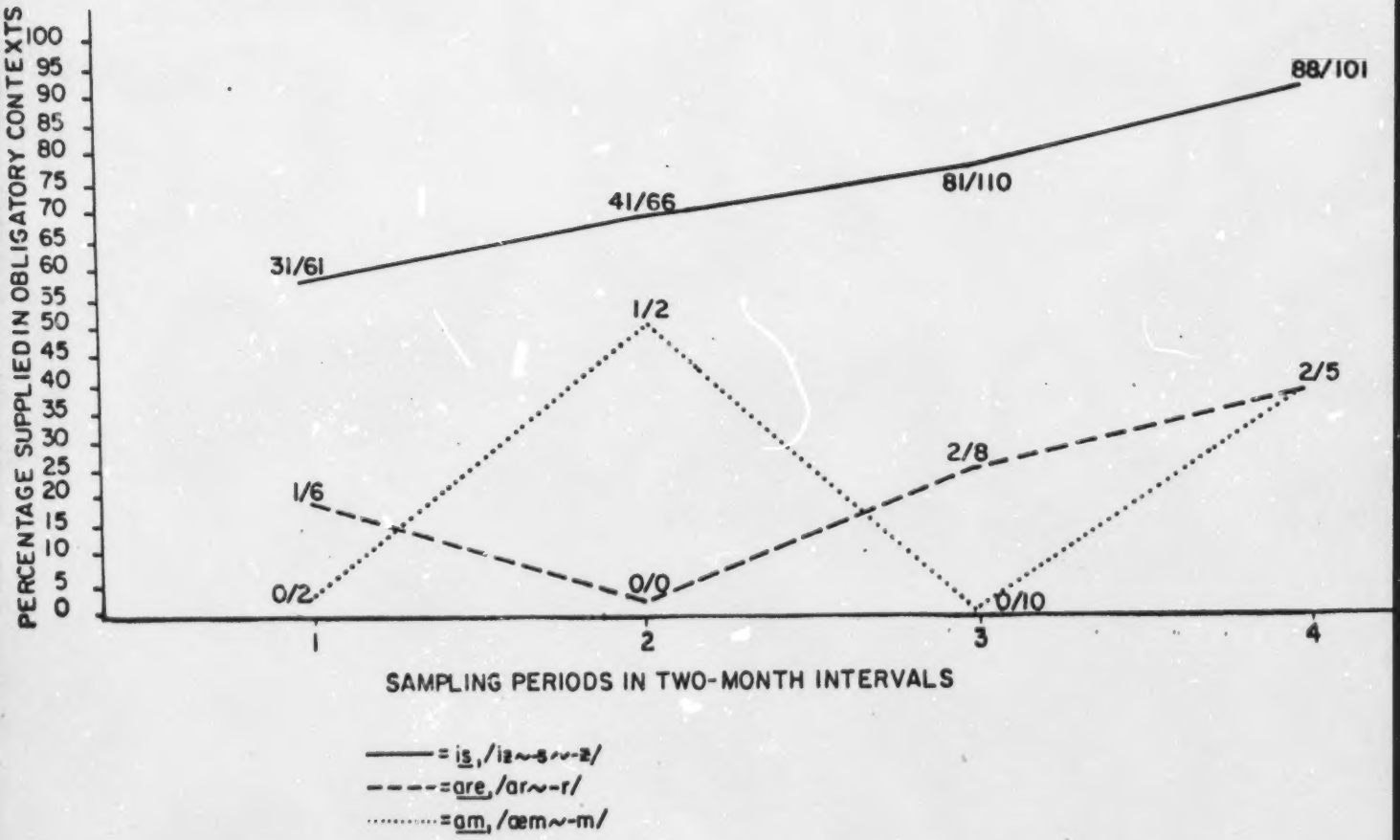

FIG. 3.1: PERFORMANCE CURVES FOR CONTRACTIBLE COPULA, THREE PRESENT TENSE MARKERS

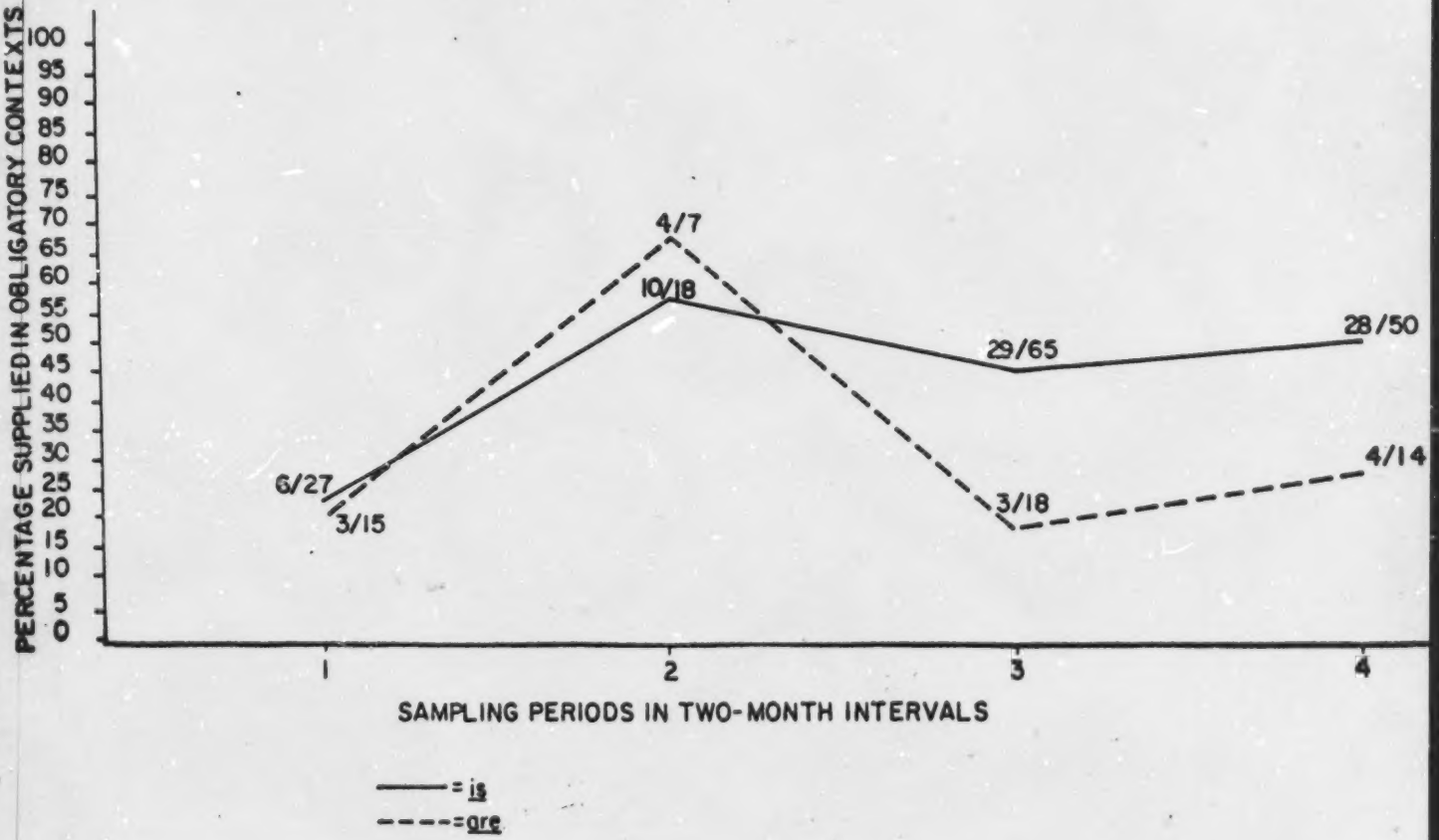

FIG. 4.1: PERFORMANCE CURVES FOR UNCONTRACTIBLE COPULA, TWO PRESENT TENSE MARKERS*

* with exception of two pronoun case substitutions in Period 1, no obligatory contexts for uncontractible copula am

even lower score (11/46) in the (Type II) yes/no question, was the frequent omission of is after the pronoun Dis. Within a single utterance it was possible to see the contrastive case, viz.:

(23) Dis Joey, dat's me.[1]

In general, the 3ps uncontractible copula was deleted in frames (1) and (2) [above] before the indefinite or definite article /ə/ , e.g.:

(3) Dis a pen?

(27) Dis /ə/ doggy's one.

and before functors and pronomial modifiers, e.g.:

(17) Dis your baby, right?

(18) Lookit, dis my paper.

(30) See, dis is -- dis for get a fish.[2]

(40) Dis about airplane.

By contrast, it was less likely to be deleted before unmodified nouns or adjectives, e.g.:

(9) Dis is t'ree, right? (This is three...)

(21) Dis is dry.

(30) Dis is button.

(38) Dis a woman; dis is Easter (Bunny).

It was not until the 7th and 8th month that the uncontractible 3ps form appeared after Dis and before other grammatical modifiers, viz.:

(33) Dis is my pocket [book].

(40) Dis is her house.

The insertion of the second phrase-medial sibilant, and the successive articulation of two minimally distinct, non-sonorant syllables, i.e.,

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[1] Numbers in parentheses indicate sample points (1-40).

[2] Complex (for/to) construction.

/ɨs/ + /ɨz/, had presumably been preempted by the inclusion of an additional weakly-stressed modifier. Of the two medial elements, (the full form copula and the modifier), the copula usually proved to be the more vulnerable item. This appeared to be a function of its low acoustic salience, lack of stress and high redundancy.

Where it was non-redundant, the full form was rarely omitted, e.g.:

(6) Yes it is. [Elliptic]

(25) Oh, dis a hand? It <u>is</u> a hand. [Emphatic]

(14) I know where it is.

(17) Here it is, I hate dis.

(21) What is it?

(23) Whose is dis?

(26) You're not going to know what is this now.

(29) Let's see what time it is.

In addition to being non-redundant, the full form is characterized in these (and similar) utterances by heightened perceptibility[1] -- either by virtue of added stress, acoustic distinctiveness from the preceding segment or syllable, or its occurrence in phrase-final position. It should be noted that instances of the latter are likely to be found in complex constructions, and particularly, in the indirect question. Although the full form often appeared, in such cases, in the inverted WH question form,[2] it was supplied with only rare exception. The complex constructions in which the form was deleted were those in which it was required after the pronoun <u>dis</u>. In fact, the cumulative performance scores for the contractible and uncontractible 3ps copula in the Type

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[1] Brown describes the "heightened perceptibility" of the uncontractible forms in terms of these frames and not in terms of the much more common, phonologically restricted frame.

[2] See (26), above. Also, e.g.: "You don't know where is it?", "I don't know what -- what is it?"

IV frame were nearly equivalent (both around the 50% level). By way of contrast, the Type I and Type II scores showed a superiority of the contractible form by margins of 34 and 44 percentage points, respectively.

In addition to this general pattern of Type I usage, there were a number of other indications that 3ps copula production was inhibited by the same phonological condition which restricted its contraction: namely, the post-sibilant position. In both contractible and uncontractible environments, the production of one sibilant (and particularly of an s segment) tended to result in the deletion or displacement of another, viz.:

(3) I' dis pen? (Is this [a] pen?)

(6) Dis i' nakin. (This is [a] napkin.)

(12) Hey, di' dis Santa Claus? (...is this...)

(23) Whose is dis? Who' is di'? (Repeat.)[1]

(27) Di' dis close'? (Is this closed?)

(30) I' dis a her? (Is this a her?)

(31) Dish you, we laughin'. (This is...)

It will be noted, in the above instances of uncontractible form usage, that the indefinite article was deleted rather than the (inverted) copula segment. The latter was, in effect, contracted, but what Brown calls the "syllabic pulse" was retained.

In contractible contexts, where the clitic had heightened stress and sonorance as a result of being affixed to a stress-bearing, phrase-initial, one-syllable word, the s segment deletion was more likely to occur in a proximate syllable. In either case, the production of one sibilant appears to have suppressed the production of the other, e.g.:

(15) Dat's hi' head. (That's his head.)

(30) Dat 'is name. (That's his name.)

---

[1] The 3ps uncontractible copula was produced in 23/23 instances of WH question constructions.
Also, as noted in the concluding discussion, the uncontractible past tense marker (was) was always supplied where required.

(30) Here's 'im hat. (Here's his hat.)

(30) What is hi' name?

(31) What dat backs? (What's that backwards?)

(37) Pretend dat i' poison.

On the basis of this combined evidence, plus other indications that the -s markers were generally subject to this type of displacement (e.g., "Daddys drive car", "Dat no fairs"), it appeared that both sets of 3ps copula omissions were a function not of their morphological status in David's grammatical system, but of their acoustic and articulatory properties in the immediate sound string or phrase.

The overall pattern of copula production suggests that developmental consistency could not be captured at the level of the morphemes, as defined by Brown, but at the level of the particular form (is, am, are) in particular contexts. In the case of the 3ps markers, there is strong evidence that contraction facilitated the production task. Rather than complicating the effort, as postulated on the basis of the phonological rules governing contraction, the cliticization of is appears to have served the purpose of reducing the length and phonological complexity of the sound string in which it was embedded.

The production pattern for the plural copula, however, indicates that the fact of contractibility, per se, does not serve as an explanatory developmental principle. As contrasted with the 3ps pair, the plural pair showed a nearly identical level of (under)development. It was in fact the case that the contractible /ar~-r/ showed greater productivity in a range of construction types, the uncontractible form having been limited to Type I usage. But within this category, the production pattern proved an exception to the otherwise major superiority of (1) contractible (and contracted) form usage over uncontractible usage and (2) 3ps usage

over 1ps and plural form usage. As shown in Figure 11, the uncontractible are has a higher performance curve than either the uncontractible is or its /ar~-r/ counterpart. The lexical and phonological condition which accounts for this exception is that are was produced with some consistency after the frequent demonstrative pronouns dese and (to a lesser extent) dose. In this sequence, the full form had considerable vocalic sonorance and was acoustically distinct in relation to the preceding syllable. Furthermore, its insertion in the sound string was not complicated by the implied production of an additional sibilant. Thus the phonological condition which inhibited the realization of the copula in its uncontractible 3ps form seems to have been the facilitating factor in the production of the uncontractible plural marker.

Analysis of salient features

With reference to the 12 forms of be, as shown in Figure 6, it was hypothesized that forms having the same sound or meaning would show a stronger developmental association than forms classified on the basis of grammatical class (copula vs. auxiliary) and phonological status (contractible vs. uncontractible). As summarized above, the results of the contextual analysis indicated that neither of the copula morphemes developed as a single and homogenous linguistic unit. The morphemes did not develop as two discrete sets of three present tense forms, but to a certain extent, in order of the frequency with which the individual markers were required: namely, is > are > am.[1] To test the hypothesis, it was necessary that the comparison be made across both the copula and auxiliary classes. This gives us an N of 12, as shown in Figure

[1]The comparison of performance scores for the contractible and uncontractible 1ps markers is problematic, as the form is always contractible after the 1ps pronoun in the (most frequent) N + copula + N/Adj construction.

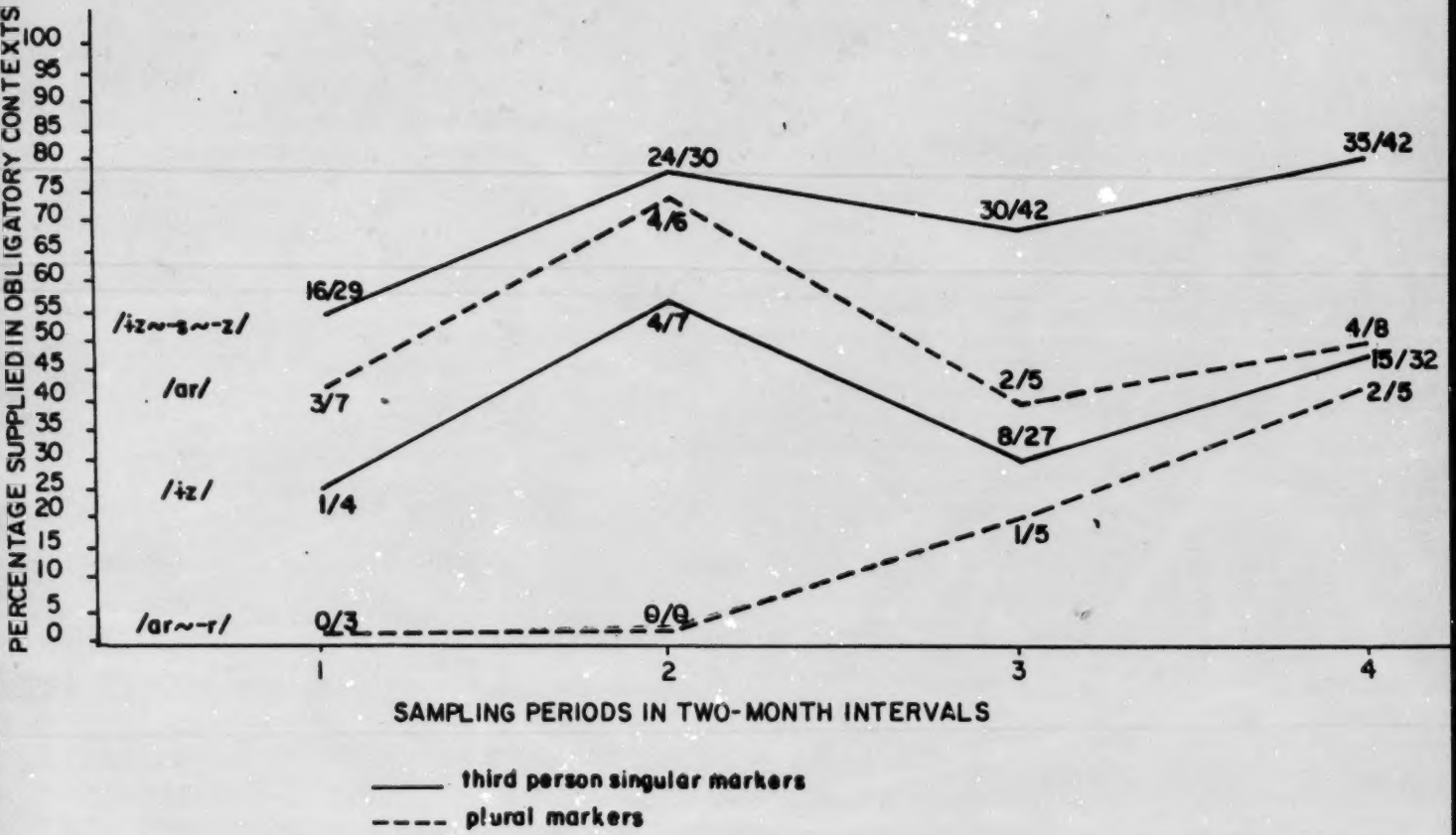

FIG. 5.10: PERFORMANCE CURVES FOR CONTRACTIBLE AND UNCONTRACTIBLE COPULA IS AND ARE USAGE IN TYPE I CONSTRUCTION

6.[1] If, in addition, one controls for the syntactic variable, there is a potential N of 43 cases (12 forms X 4 construction types minus 5 null categories, as shown in Figure 12).

The internal structure of the cumulative scores, as compared for differences within and across the morpheme classes, is graphically depicted in Figure 13. The bar graphs on the left side of the figure show the proportional relationship of marker scores within each of the 4 be morpheme sets. The bar graphs on the right side of the figure show the differences in scores between (1) semantic pairs (markers as matched for meaning) and (2) phonological pairs (markers as matched for sound.) The differences between members of the semantic pair show the cumulative effects of the contractible/uncontractible distinction. The differences between the members of the phonological pairs show the cumulative effects of the copula/auxiliary distinction.

When thus matched on the basis of either semantic or phonological identity, the paired forms show a closer relationship to each other than to the other forms (or so-called "allomorphs") in the same morpheme class. Summarily stated: (1) the effects of semantic identity, at the level of the markers, overrides the effect of the phonological class distinction between contractible and uncontractible

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[1]The final accuracy ordering of the 12 forms was compared with the final performance data reported for Brown's three normal subjects (op. cit.:268). The three comparisons yielded non-significant correlations $p > .05$). The aphasic data were also compared with the rank-ordering of the be forms as based on Brown's assigned complexity values (Ibid.:377). Comparison with the cumulative scores obtained a negative correlation (Spearman rho = -.06). The final scores also obtained a negative correlation (rho = -.17).

When rank-ordered for relative frequency of obligatory contexts, David's cumulative scores obtained a significant correlation of .74 with his accuracy ordering (nearly at the .01 level).

Figure 12. Twelve present tense forms of BE in context of actual or possible utterances

MORPHEME		COPULA				AUXILIARY			
		Contractible		Uncontractible		Contractible		Uncontractible	
CONTEXT		Frame	1st Sample	Frame	1st Sample	Frame	1st Sample	Frame	1st Sample
am	I	I'm tired.	38	*I am.	--	I'm not comin.	8	*I am going.	--
	II	*I'm right?	--	*Am I right?	--	°I gonna cut dat?	20	°Am I going?	--
	III	[Null]		*Where am I?	--	[Null]		*Where am I going?	--
	IV	Not me, I didn't go cause I am with you.	33	*You don't know where I am.	--	°It's mon'ta, so I cryin.	21	°Where am I supposed to go?	--
are	I	Dey're happy marries.	27	My hands are tired.	5	We're gonna cook dis today.	22	°You am!	14
	II	Der're bran' new?	6	Some of dese are wrong, right?	25	°You gonna say raisins?	5	°Why, kids gonna see us?	31
	III	[Null]		°What's dese?	5	[Null]		How are you do it?	27
	IV	Because they're for us.	23	Dese are for -- dis for him [to] go.	30	You're poze' t' sleep!	14	*Because the horses are running.	--
is	I	It's clock.	1	Dis i' nakin.	6	Hurry up, it's raining.	8	Dis is hurtin.	27
	II	Dat's all now?	6	I' dis pen?	3	Now it's bleedin?	35	*Is dis hurtin?	--
	III	What is dat?	4	What is it?	6	Who's cryin?	10	[Null]	
	IV	Dat's all me want.	10	I know where it is.	14	Yah, because is s'owin out.	19	°Because dis 'poze' t' be blue. . .	28

Key °Omission context; no uses supplied.

*Possible frame; no contexts supplied.

forms;[1] and (2) the effect of phonological identity, at the level of the markers, overrides the effect of the grammatical class distinction between copula and auxiliary forms.[2] In other words, the importance of the phonological contingency is relative to the pair of sounds in question. The effect is variable within each of the two grammatical classes and is consistent across the grammatical classes. Similarly, the effect of the grammatical class contingency is variable with respect to the meaning of the pair in question. The effect is variable within each of the two phonological classes and is consistent across the phonological classes.

In a subsequent series of tests, the developmental orderings of the 12 present tense forms, as based on relative accuracy scores for both the total and final sampling periods, were analyzed for the probabilities associated with the (rank-order) distribution of several sets of variables:[3] grammatical class (copula vs. auxiliary), phonological class (contractible vs. uncontractible) and marker class (is, am, are).[3] In addition, the same (Mann-Whitney U) test was applied to

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[1] Within both the copula and auxiliary classes, the pairs which show the greatest effect of the contractible/uncontractible distinction are the 3ps pairs. The 1ps pairs show the next greatest effect of this distinction. The plural pairs show virtually no effect of the phonological distinction.

[2] Within both the contractible and uncontractible classes, the 3ps pairs show the greatest effect of the copula/auxiliary distinction. The plural pair shows the next greatest effect. Just as the plural pairs showed virtually no effect of the contractible/uncontractible distinction, the 1ps pairs show no visible effect of the copula/auxiliary distinction.

[3] Based on the Mann-Whitney U Test (Siegal 1956). "The null hypothesis is that A and B have the same distribution. The alternative hypothesis, H_1, against which we test H_o, is that A is stochastically larger than B, a directional hypothesis. We may accept H_1 if the probability that a score from A is larger than a score from B is greater than one-half" (Ibid.:116).

[4] When rank-ordered separately, the final accuracy orderings of the copula and auxiliary forms obtain a significant correlation (Spearman $r = .83$, $p = .05$). When matched for number and person, the six matched pairs show a significant superiority of the contractible forms over the uncontractibles and of the copula forms over the auxiliaries: in both cases $p = .025$ (The Wilcoxen Matched-Pairs Signed-Ranks Test, in Siegal 1956).

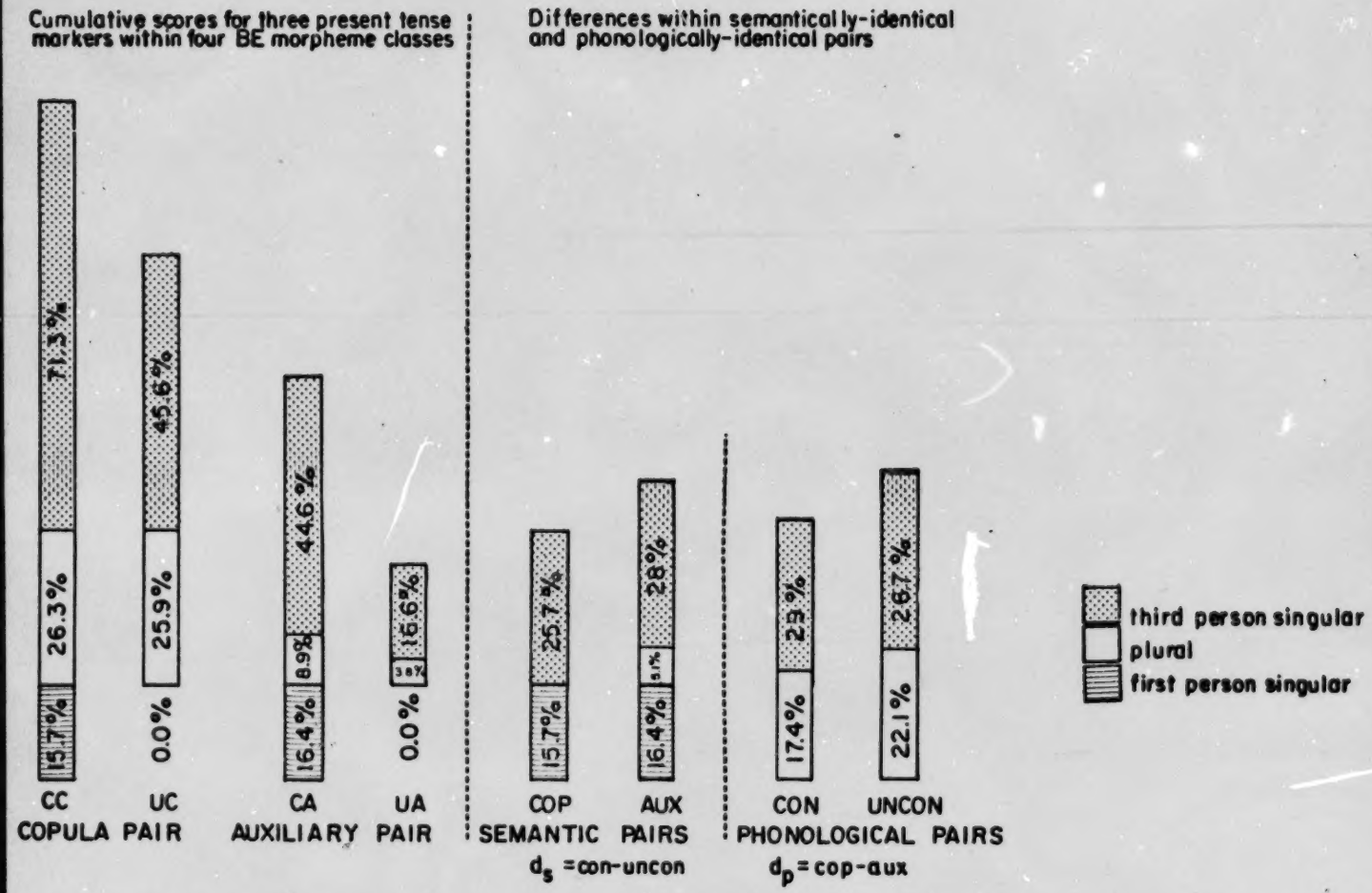

FIG. 5.9: DIFFERENCES IN CUMULATIVE PERFORMANCE SCORES WITHIN AND ACROSS MORPHEMES, SEMANTIC PAIRS AND PHONOLOGICAL PAIRS

two expanded series, based on the cumulative and final performance scores for all forms as calculated on the basis of the individual construction types. The final scores yielded an N of 24, and the cumulative scores, an N of 32.[1] For the purpose of illustration, the rank-ordering of the final scores is shown below (Figure 14).

Figure 14. Accuracy ordering of final be marker performance scores (N = 24)

marker	grammatical class	phonological class	construction type	rank[a]
[3	copula	contractible	II	23.5
[3	cop	uncontractible	III	23.5
3	cop	con	III	22
3	cop	con	I	21
3	cop	uncon	IV	20
3	cop	con	IV	19
3	auxiliary	con	I	18
3	cop	uncon	I	17
3	aux	con	IV	15.5
[2	cop	uncon	I	15.5
2	cop	con	I	14
[3	aux	con	II	12
[2	aux	con	I	12
[1	cop	con	II	12
3	cop	uncon	II	9
[1	cop	con	I	9
[1	aux	con	I	9
[3	aux	con	III	4
[3	aux	uncon	I	4
[2	cop	uncon	III	4
[2	aux	con	II	4
[2	aux	con	IV	4
[2	aux	uncon	III	4
[2 1	aux	con	IV	4

[a]Higher rank = higher relative accuracy score

When pooled across construction types, the final and cumulative scores for the 12 be markers yielded two different sets of results. The final scores show the three sets of variables to be significant at the .05 level. That is, there is a significantly higher rank-order

[1]No scores of 0/0 were included.

distribution of the copula forms over the auxiliaries, the contractibles over the uncontractibles, and of the 3ps forms over the others. In the cumulative accuracy ordering (which offers less information from a developmental point of view, but which has the advantage of augmented frequency ratios), the effect of the person/number distinction is strong enough to extinguish the effects of the two purportedly "major contingencies" in normal be morpheme development. The lead of the 3ps markers is significant at .008, while there is no significant distribution of the copula form vs. the auxiliaries or of the contractible forms vs. the uncontractibles.

When distinguished by syntactic context, the final scores (Figure 14) continue to show a significant effect of the marker distinction. The 3ps markers lead the rank-ordering at the .001 level. The copula leads at the .01 level, while the contractible forms do not show a significant lead over the uncontractibles ($p > .05$). The analysis of the cumulative performance scores yielded the same results. In addition, the distribution of scores for 3ps copula usage is significantly higher than all other types of usage ($p < .001$), and the distribution of 3ps contractible usage is significantly higher than all other types of usage ($p = .01$). This is consistent with the initial hypothesis predicting the close developmental association between forms having the same sound or meaning. The developmental superiority of the semantically identical 3ps copula pair (inclusive of its contractible and uncontractible variants) is clearly associated with the high frequency of obligatory contexts in David's spontaneous speech. The superiority of the phonologically identical 3ps contractible pair /iz~-s~-z/ is similarly associated with higher contextual frequencies (as contrasted with other contractible

markers) and with the generally large superiority of these 3ps forms over their uncontractible counterparts (Figures 8 and 13).[1] The superiority of the 3ps copula pair suggests the developmental effect of semantic salience, while the superiority of the 3ps contractible pair suggests the combined effects of semantic and phonological salience.

[1]As was the case for copula /iz~-s~-z/ usage, the pattern of contractible 3ps auxiliary production showed the vast predominance of short form usage over long, and it also showed the earlier and more consistent development of the voiced /-z/ (as contrasted with the voiceless /-s/) allomorph.

SUMMARY AND DISCUSSION

The comparative study of grammatical morpheme development in normal and aphasic (or "language delayed") children has produced findings which, in the view of some investigators, suggest that the delayed development of these forms arises from a more general cognitive impairment. This theory says that aphasic development is like normal development in slow motion. It has been associated with the hypothesis that the order in which the grammatical forms develop is determined by the relative difficulty or complexity of the grammatical and semantic rules underlying their use (Brown 1973; Morehead and Ingram 1973; Tyack and Gottsleben 1974; Kessler 1975). Various formulations of this hypothesis have been tested in the longitudinal study of grammatical morpheme development in normal children (Brown 1973); in the cross-sectional comparison of normal and aphasic language data (Morehead and Ingram 1973); and in the cross-sectional comparison of aphasic language data and Brown's normal longitudinal findings (Kessler 1975; Johnston and Schery 1976). The comparative studies concur in the finding that aphasic children acquire grammatical morphemes in the same order and (with the exception of the Johnston and Schery study) at the same MLU levels as (much) younger, normal children. This in turn has led to the use of the MLU index as a diagnostic and remedial instrument, the language delayed child being trained to produce those forms which are purportedly appropriate to that level of "language readiness" (Tyack and Gottsleben op. cit.).

Whether the language disorder in question is cognitive or, alternatively, perceptual in origin continues to be a matter of some debate. Among the many investigators who report findings of temporal sequencing constraints in this population, Tallal (1975, 1977) and Tallal and Piercy (1973a, 1973b, 1974a, 1974b) argue that the disorder is neither cognitive nor syntactic, but that it derives from a primary impairment in the auditory processing system. Other investigators (cf. Menyuk 1975; 1977) have observed that aphasic language performance is especially marked by phonological difficulties.

The findings reported here are resumed from the longitudinal study of language development in an aphasic child (aged 5,5-6,1). The

results are, on the whole, inconsistent with the empirical claims regarding the "universal" ordering and MLU staging of the 14 grammatical morphemes which constitute Brown's normal acquisition sequence. The majority of the items (the nine VP constituents) do not obtain a significant correlation with the developmental ordering reported by Brown; and none of the 14 items is acquired at the predicted MLU level (Stages I through V). With respect to the previous claims concerning the significant similarity between the normal and aphasic acquisition sequences, the present findings lend support to Rosansky's (1976) observation that developmental comparisons of this sort can be falsified in the absence of longitudinal and contextual data; and that the resultant similarities may be an artifact of the cross-sectional method of comparison.

Relative accuracy scores at a single point in time were found, in the present case, to be subject to low frequency distortion; and in most cases, the longitudinal performance curves, as plotted over (40) individual sampling points, did not show a smooth and gradual line of growth. The aphasic data did not demonstrate the applicability of the normal acquisition criterion. A greater measure of developmental consistency was found on the condition (1) that accuracy ratios were pooled across successive samples consisting of a minimum total of 200 utterances; (2) that sample points were (therefore) plotted on an (aggregated) bi-weekly or monthly (rather than daily) basis; and (3) that performance for a given morpheme was analyzed at the most concrete level of its representation, syntactic and phonological context being identified as a critical performance variable.

The hypothesis which predicts the order of development on the basis of cumulative grammatical complexity (cf. Brown op. cit.) was empirically falsified on several counts: (1) the order of development of the nine VP constituents did not obtain a significant correlation with Brown's complexity ordering; (2) the internal structure of the VP constituent ordering showed a reverse relation between the "most complex" items and their "less complex" counterparts; and (3), when scored at the level of the individual forms, rather than at the level of the more abstract morpheme categories, the 12 present tense forms of be were found to obtain a (slight) negative correlation with Brown's complexity

ordering of the four be morphemes. In addition, the final performance scores for these 12 forms, as compared with those reported for Brown's three normal subjects, did not obtain significant correlations. Alternatively, it was found that the final accuracy ordering of the aphasic scores obtained a strong significant correlation with the frequency ordering, as based on the relative frequency of obligatory contexts in the child's spontaneous speech.

Entailed in the grammatical complexity hypothesis, as operationalized in the complexity ordering of the morphemes, is the implied prediction that each morpheme category would show greater internal developmental consistency than forms sharing semantic or phonological features across the morpheme categories. The data were found to support the opposite formulation. Within each of the two copula and auxiliary classes, the six forms of is, am and are were found to evolve along the lines of semantic and phonological identity. These dimensions of similarity proved to be of much greater developmental consequence than those based on the more general classification by grammatical class (copula vs. auxiliary) and phonological status (contractible vs. uncontractible).

Although the contractible be forms are predicted to develop later, on the premise that their development is impeded by a number of additional rules governing contraction (cf. Brown op. cit.), the contractible forms were generally found in this case to have a statistically significant superiority over their "phonologically less complex" counterparts. However, the margin of superiority within each of the semantically identical pairs was found to differ appreciably with respect to the pair in question. It was most pronounced in the case of the (most developed) third person singular pairs and was negligeable in the case of the plural markers. Analysis of production patterns in four construction types, and in a range of lexical and phonological contexts, clearly indicated that these differences were a function not of the general rules governing contraction, but of the acoustic and articulatory properties of the required form, as conditioned by its immediate linguistic environment.

Based on the longitudinal and contextual analysis of copula production, it was found that the two copula morphemes (required in a total of 592 utterances) were internally characterized by a differential pattern

of omission. This could be specified at the level of the marker (3ps, 1ps or plural) and, within each of the marker categories, at the level of particular construction types. While 3ps usage was far more developed than that of are or am, consistent with its much higher contextual frequency, it was internally characterized by a far greater probability of contractible (and contracted) form usage, and by a high incidence of uncontractible form omissions in one environment: namely, that in which contraction was restricted on phonological grounds and in which, by definition, the semantic role of the marker was usually redundant. By contrast, the uncontractible form proved relatively invulnerable to omission in contexts where it was non-redundant and had stronger acoustic marking (as in emphases, ellipses, subject-predicate inversions or the complex indirect question). By the same token, the uncontractible past singular marker (was), predicted by the normal and clinical models to be a much later development, was consistently supplied where required. This was attributed to the combined effects of its greater vocalic sonorance and its non-redundant role. Relatedly, the use of the uncontractible plural marker (are) was shown to be superior to the uncontractible 3ps marker in one environment: namely, that in which it followed the plural demonstrative pronoun, and in which contraction was precluded on phonological grounds. In this frame (Dese + copula + N/Adj or Q Dese + copula + N/Adj [+tag]) the plural copula has increased vocalic sonorance and is acoustically distinct from the preceding sound. Thus, the phonological condition which favored the realization of are, in this uncontractible frame, was that which accounted for the deletion of is in the same type of frame: i.e., that in which it followed the demonstrative pronoun dis, and in which it was minimally distinct from the preceding syllable and sibilant. It was this frame (Dem PN + copula + N/Adj) which accounted for the nearly identical cumulative scores for the contractible and uncontractible are. In other construction types, contractible (i.e., contracted -r) usage showed superior development.

Finally, it is important to note that the 3ps contractible copula, being the most developed of the 12 forms, was internally characterized by the superior development of the voiced (/-z/) as contrasted with the voiceless (/-s/) allomorph. The most consistent use of either clitic occurred where it could be affixed to a phrase-initial word of one syllable.

In sum, the probability of be form production was found to vary in function of (1) vocalic sonorance, (2) acoustic distinctiveness with respect to preceding syllables and segments, (3) stress levels, (4) relative redundancy and (5) the ease with which the segment could be articulated in combination with adjacent segments. In addition, there was a fairly consistent association between higher accuracy levels and the frequency with which the form was required, both in general and in the context of particular construction types. This principle does not generalize to non-redundant uses. The complex indirect question had relatively low levels of occurrence, but higher relative accuracy scores -- as an environment of uncontractible 3ps usage -- than the far more frequent yes/no question. And while the past tense forms were rarely required, they were supplied without exception from the earliest (of about a dozen) instances.

What this suggests is that the relatively low accuracy score for a given morpheme does not necessarily attest to the absence of that form in the child's grammatical system; nor do morphological omissions in themselves constitute reliable evidence of a cognitive or syntactic deficit. Alternatively, it is proposed that the frequent deletion of the more redundant and less perceptible items can result from a strategic tendency to reduce the length and phonological complexity of the sound string or phrase. An abnormally diminished MLU level is the likely result of this sound simplication strategy. As recently noted by Leonard et al (1976), the MLU index is primarily expanded by the addition of these (generally redundant) surface features.

When matched for MLU level with Brown's male subject (Adam), David appeared to be delayed in grammatical morpheme development by at least two years and as much as three MLU stages. The last of the normal acquisitions (the contractible copula and auxiliary morphemes) had, however, in David's case, reached higher performance levels than those reported for all three normal subjects. The contractible copula, in fact, was the third of David's VP morphemes to attain Brown's normal acquisition criterion. Thus the MLU level, in the aphasic case at least, does not appear to serve as a reliable index of linguistic and/or

cognitive development. Its validity, like that of the relative accuracy measure, would seem to be compromised by performance constraints which may or may not impinge on morphological production in younger, normal children.

If Brown's findings (as supported in the subsequent cross-sectional study of de Villiers and de Villiers (op. cit.)) are representative of normal development patterns, then the present normal/aphasic differences might be reasonably attributed to the combined effects of David's greater cognitive maturity, on one hand, and of temporal sequencing difficulties, on the other.

However, there are several respects in which the normal and aphasic data are not comparable, and these place evident limitations on this interpretation. First of all, the normal ordering of the morphemes and the relative accuracy scores on which this was based are not generally amplified with respect to actual frequency ratios. Percentages based on e.g. 5 or less obligatory contexts are apt to be distorted in either direction. (This was apparently a problem in the normal scoring of the uncontractible auxiliaries and it might also have been the case for the uncontractible copula.) Secondly, the scores on the individual morphemes are not generally specified with respect to the syntactic and phonological context of their use/omission. As recently noted by MacWhinney (1978:17), Brown had "not yet turned his attention to the sequence of acquisition of allomorphs"; and there is little way of knowing whether the morphemes did, in fact, constitute fairly homogenous units of linguistic behavior or knowledge.

This problem is compounded, in the case of the four be morphemes, by the existence of the intermediate level forms, referred to here as "markers" (rather than "allomorphs"). It was found that the curves for the morphemes, the markers and the markers as scored by construction type, were consistently distorted by the higher frequency forms. The aggregate curves and accuracy ratios tended to mask internal deviations from the numerically predominant pattern. Similarly, there is some evidence to suggest that the normal data, disaggregated by subject and

marker, do not conform to the mean acquisition sequence nor to its theoretical account. In any case, the normal data do not permit of comparison at the morphophonological level.

There is no present basis, then, for a comparative assessment of the effects of semantic and phonological identity, and relatedly, of the ostensible effects of semantic and phonological salience. The aphasic pattern of development, as detailed earlier in the case of the copula, and as borne out elsewhere (Cousins 1979) in the examination of the auxiliaries, suggests that the salient developmental unit was not the be morpheme, as defined on the basis of grammatical class and contractibility, but rather the portmanteau morph, e.g. /iz~-s~-z/, comprising both the contractible and uncontractible variants of a given person/number/tense marker.

The aphasic pattern also shows a fairly strong and consistent effect of communicative intent, or semantic salience, as partially measured by the relative frequency of obligatory contexts in spontaneous speech. It remains to be demonstrated that this does not figure as an important factor in normal grammatical morpheme development. In fact, MacWhinney cites strong evidence in support of the claims that "children. . . learn forms for intentions they very much want to express but for which they do not have forms" (op. cit. :10) and that "the first productive uses and the first overgeneralizations of an affix will make use of the most frequent form" (Ibid.:12). The author also observes that "semantic or grammatical complexity bears no obvious relation to these acquisitions" (Ibid.:17).

In addition, MacWhinney argues that the "shape of early words is heavily influenced . . . by natural predispositions"; that these "seem to be based on something like the principle of "least effort"" (Ibid.:17); and that "morphophonological patterns that are in accord with [these] natural phonological dispositions . . . enter early and . . . seldom lead to errors" (Ibid.:18).

It seems reasonable to suppose that morphological development in aphasic children is particularly susceptible to the effects of these early phonological dispositions, and that aphasic production

patterns, at later than normal ages, would be strongly influenced by "a principle of least effort in phonology" (Ibid.). In this sense, then, and barring the effects of intentional differences, it would be anticipated that certain important similarities would be found in the order of normal and "delayed" morphophonological acquisitions. However, it appears that neither the clinical model of grammatical morpheme acquisition (cf. Tyack and Gottsleben op. cit.), nor the normal model based on Brown's findings, offers a secure basis for normative generalization. The former is limited by the constraints inherent in the cross-sectional method of comparison, and the latter is limited with respect to the linguistic level at which the developmental units are defined and analyzed. And inasmuch as the "same but slower" model of aphasic development has been strongly influenced by the theory of cumulative psycholinguistic complexity, there is further reason to re-examine the premises which inform its clinical application.

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